

Peak Expiratory Flow Rates in Children with Severity of Lower Respiratory Tract Infection

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Abstract:

Background: Lower respiratory tract infections (LRTI) are a leading cause of critical illness and mortality in mechanically ventilated children; however, the pathogenic microbes frequently remain unknown. We combined traditional diagnostics with metagenomic next generation sequencing (mNGS) to evaluate the cause of LRTI in critically ill children. Correlation of peak expiratory flow rate (PEFR) with severity of lower respiratory tract infection and comparison of PEFR with same age and sex height and nutritional status of children age group of 7 to 18 year.

Method: Case control study in Children in age group of 7 to 18 years of both sex suffering from LRTI and comparing their PEFR with normal children with of age and height.

Result: In case of LRTI group, the PEFR had significant difference from control group, in all three-age group (p-value <0.0001). The study shows positive colinear relationship between age, height, weight and BMI with PEFR in both males and females in control and LRTI group of population.

Conclusion: The study showing the effect of PEFR depends upon anthropometric measurement of child of different age group in both LRTI population and control population. In control group PEFR shows significant difference between boys and girls, but in case of LRTI group the PEFR shows non-significant difference between boys and girl in their respective age groups.

Keywords: LRTI, PEFR, Children.

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Introduction

The substantial decline in the burden of childhood community acquired lower respiratory tract infections (LRTI) over the last decades is associated with improvements in immunization, nutrition, socioeconomic, and control of the HIV epidemic.

However, LRTI remains the commonest cause of under-5 mortality outside the neonatal period. Although most children with LRTI fully recover, a proportion develop chronic respiratory symptoms and/or sequelae; reasons include host factors (immunosuppression, poor secretion clearance, airway abnormalities or genetic factors), infectious causes (TB or adenovirus), and/or adverse environmental factors. Early identification and management of children at-risk of respiratory sequelae may help to preserve long-term lung health.

However, knowing who and when to investigate is challenging as there is little high-level evidence to support the timing and extent of investigations required.

Materials and Methods

Our study was a case control study, which included 7-18 year old children, of both sex suffering from

LRTI. The anthropometric measurements like height (in cm), weight (in kgs), chest circumference and Body mass index were recorded in a pre-designed proforma and PEFR was measured by a "mini Wright's peak flow meter" (600-800 L/min).

We excluded the following admitted patients: suspected or known immunosuppressive, cardiac and neurological condition affecting pulmonary function, other chronic pulmonary disease and children with rib cage deformity or children who were not able to perform peak expiratory flow rate and who did not give consent.

The study included 2 groups of children, one is LRTI group of children having signs and symptoms of lower respiratory tract infection and another is a Control group of children having healthy and asymptomatic children. There were a total of 250 number of children in each group each belonging to 7-18 years.

The LRTI group and Control group population had 150 boys and 100 girls in each group. The value of PEFR was recorded serially at 5 mins, 10 mins and 15 mins before the commencement of treatment.

The value of PEFR in LRTI group and control group was compared according height weight, BMI and chest circumference, from both sexes and were

compared using paired t-tests and ANOVA test to establish construct validity.

Results

Table 1: Correlation Coefficient Values of Peak Expiratory Flow Rate with Age, Weight, Height, BMI and Chest Circumference

Variables	Boys		Girls	
	Correlation coefficient		Correlation coefficient	
	Control	LRTI	Control	LRTI
Age (in years)	0.96	0.89	0.98	0.74
Weight (kg)	0.85	0.92	0.77	0.71
Height (in cm)	0.79	0.94	0.86	0.73
BMI (kg/m ²)	0.69	0.88	0.71	0.68
Chest circumference (cm)	0.82	0.92	0.78	0.70

Table 2: Age group and their mean PEFR values on both groups

Age (in years)	LRTI Group (n=250)		Control group (n=250)		P value	
	Boys (n=125)	Girls (n=125)	Boys (n=125)	Girls (n=125)	Boys	Girls
7 – 10	136.42±45.28	140.32±64.16	304.23±35.90	298.62±34.55	<0.0001	<0.0001
11 – 13	190.42±44.09	197.36±66.15	407.15±27.20	382.20±23.49	<0.0001	<0.0001
14 – 18	340.46±61.78	294.26±88.39	457.87±33.79	472.60±35.00	<0.0001	<0.0001
Total	195.36±90.39	192.36±93.10	416.32±76.60	396.02±70.40	<0.0001	<0.0001

In table no. 1 for control group, p value 0.048, considered significant and for LRTI group, p value 0.800, considered statistically non-significant. The P value of mean PEFR between normal male and Female showing significant difference in control Compared to the control group, the PEFR value in LRTI group has significant mean difference in their mean PEFR values in all age groups which are statistically highly significant.

In our study, the value of PEFR is decreased for LRTI group as shown in Table no. 2. This conclusion is different from the following study by Sree Krishna Y., Aditi Banik et al. i.e. there is no significant difference in the value of PEFR in their LRTI population.

The t-value of mean PEFR between normal male and Female showed significant difference, but the t-value of means PEFR value between male and female of LRTI group showed non-significant difference. The study result shows similar conclusion in study Sree Krishna Y., Aditi Banik, et al that concluded that the value of PEFR in LRTI group patient in between male and female having non-significant difference.

Conclusion

The study showing the effect of PEFR depends upon anthropometric measurement of child of different age group in both LRTI population and normal population. In control group PEFR has significant difference between boys and girls but in case of LRTI the PEFR having non-significant difference between boys and girl. The value of PEFR in between LRTI patient and normal children are having significant differences concluded that PEFR

group. The P value of mean PEFR between LRTI group male and female showing non-significant difference in LRTI group.

Discussion

can be used in diagnosis of LRTI. It is likely that any measure of severity requiring expiratory manoeuvres would be difficult to obtain in a patient with severe obstruction and respiratory distress.

The patient would have trouble getting enough air entry during inspiration to have a meaningful expiratory measurement, PEFR measures. The drawbacks its very difficult to give command for PEFR in children less than 7 years age.

The value of PEFR is effort dependent so if the child not willing to perform or unable to understand the instruction the value of PEFR will be falsely low.

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